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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD MCA I Semester Examinations, July/August - 2021 COMPUTER ORIENTED STATISTICAL METHODS

Time: 3 Hours

Max. Marks: 75

Answer any five questions All questions carry equal marks

- 1.a) In a certain assembly plant, three machines, B1, B2, and B3, make 30%, 45%, and 25%, respectively, of the products. It is known from past experience that 2%, 3%, and 2% of the products made by each machine, respectively, are defective. What is the probability that a randomly selected finished product is defective?
 - b) You enter a chess tournament where your probability of winning a game is 0.3 against half the players 0.4 against a quarter of the players and 0.5 against the remaining quarter of the players you play a game against a randomly chosen opponent. What is the probability of winning? [8+7]
- 2.a) A random variable X may assume 4 values with probabilities $\frac{1+3x}{4}$, $\frac{1-x}{4}$, $\frac{1+2x}{4}$, $\frac{1-4x}{4}$. Find the condition on x so that these values represent the probability function of X.
 - b) The joint probability density function of two random variables X and Y is

$$f_{xy}(x,y) = \begin{cases} \frac{5}{16}x^2y & \text{for } 0 < y < x < 2\\ 0 & \text{other wise} \end{cases}$$

Find : i) the marginal density of X and Y ii) Are X and Y are independent? [7+8]

- 3.a) Find the mean of the random variable whose probability density function is given by $f(x) = 3/5 \ 10^{-5} \ (100 x) \qquad 0 \le x \le 100.$
 - b) If X is the number appearing on a die when it is thrown, show that the Chebshev's theorem given P[$|X, \mu| > 2.5$] < 0.47, while the actual probability is zero. [8+7]
- 4.a) Show that mean = variance for a Poisson distribution.
- b) Probability of a success is given by 0.4 if n = 8, find the i) $P(x \ge l)$ ii) P(0 < x < 4). [7+8]
- 5.a) The lognormal distribution is found to be a good model for strains in structural members caused by wind loads. Let the strain be represented by *X*, with $m_X = 1$ and variance of *X* is 0.09. (i) Determine the probability P(X > 1 2). (ii) If stress *Y* in a structural member is related to the strain by Y = a + bX, with b > 0, determine f _Y(y) and m_Y.
 - b) The life of a power transmission tower is exponentially distributed, with mean life 25 years. If three towers, operated independently, are being erected at the same time, what is the probability that at least 2 will still stand after 35 years? [8+7]

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Take 30 slips of paper and lable 5 each -4 and +4, lable 4 from each -3 and 3, three each 6.a) -2 and 2 and two each -1, 0, and 1. If each slip of paper has the same probability of being drawn, find the probabilities of getting -4,-3,-2,-1,0,1,2,3,4 and find the mean and the variance of this distribution.

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- Find the probabilities that a random variable having the standard normal distribution will b) take on a value i) Between 0.87 and 1.28 ii) between -0.34 and 0.62. [7+8]
- 7.a) A manufacturer of electric lamps is testing a new production method that will be considered acceptable if the lamps produced by this method result in a normal population with an average life of 2,400 hours and a standard deviation equal to 300. A sample of 100 lamps produced by this method has an average life of 2,320 hours. Can the hypothesis of validity for the new manufacturing process be accepted with a risk equal to or less than 5%?
 - Among 200 items 50 are defective and from another sample among 400 items 80 are b) defective. Test at 0.05 level whether there is a significant difference between the proportions. [8+7]
- 8.a) Find the linear least square fit y = a x + b for the experimental data points given by: $\{(1, 2), (3, 4), (2, 6), (4, 8), (5, 12), (6, 13), (7, 15)\}$
 - , 1: . obtaint . = 0.512y + . coefficient ii) . ---ooOoo--- CO Ranket b) The following regressions equations were obtained from a correction table y = 0.516x + 33.73x = 0.512y + 32.52Find the value of i) The correlation coefficient ii) The mean x's iii) the mean of y's.

[7+8]